REMARKS

The Office Action dated October 28, 2009, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

By this Response, claims 2 and 11 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. No new matter has been added. Support for the above amendments is provided in the Specification, at least, on page 22, line 7, to page 23, line 15. Accordingly, claims 2, 8, 11, 13, 14, and 16-19 are currently pending in the application, of which claims 2 and 11 are independent claims.

Furthermore, Applicants respectfully request the Office acknowledge and accept the drawings filed on July 28, 2006, and Applicants' claim for foreign priority based on the certified priority documents that were also filed on July 28, 2006. None of the Office Actions (December 4, 2008, May 22, 2009, or October 28, 2009) of record indicate that either of the aforementioned have been acknowledged by the Office (*i.e.*, none of the boxes on the Office Action summaries have been checked).

In view of the above amendments and the following remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections to the claims for the reasons discussed below.

Claim Rejections under 35 U.S.C. §102(b)/103(a)

The Office Action rejected claims 2, 8, and 16-19 under 35 U.S.C. §102(b) as being allegedly anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being allegedly unpatentable over Kaufman (U.S. Patent No. 4,011,077). Applicants respectfully submit that the claims recite subject matter that is neither described nor suggested in Kaufman.

Claim 2, upon which claims 8 and 16-19 depend, recites a layered Fe-based alloy member. The layered Fe-based alloy member includes a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member. The coating includes a carbide formed by carbonizing a first element that includes a property to increase a hardness of the layered Fe-based alloy member at the first portion. The coating further includes a thickness of at least 0.5 mm. The layered Fe-based alloy member further includes a second element disposed in a second portion of the layered Fe-based alloy member. The material includes an amount that is greater on the outer surface than at an inside portion of the layered Fe-based alloy member. An amount of the first element is greater at the inside portion than on the outer surface of the layered Fe-based alloy member. A hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member.

Claim 11, upon which claims 13-14 depends, recites a method for producing a layered Fe-based alloy member having an increased hardness at a first portion of the member from an outer surface to an inside portion thereof. The member includes a

coating disposed on an outer surface of the first portion of the member. The coating includes a thickness of at least 0.5 mm and a carbide formed by carbonizing a first element that includes a property for increasing the hardness of the Fe-based alloy member. The member further includes a second element, other than the first element, disposed in a second portion of the member, whereby the second element includes an amount that is greater on the outer surface than at the inside portion of the member. An amount of the first element increases from the outer surface to the inside portion. The method includes applying, to a surface of the Fe-based alloy member at the portion, a powder including a substance that comprises the first element. Further, the method includes heat-treating the Fe-based alloy member with the powder applied thereto, so that the first element is diffused to the outer surface of the member at the first portion. The first element reacts with carbon existing in the outer surface of the Fe-based alloy member to form the carbide.

As will be discussed below, Kaufman fails to describe or suggest each and every element recited in claims 2, 8, 11, 13, 14, and 16-19, and therefore fails to provide the features discussed above.

Kauffman is directed to a mechanical mixture of selected powders that are compressed into a pre-compact, whereby the pre-compact is subjected to liquid phase sintering for producing a raw alloy steel product (Kaufman, Abstract). The mixture of selected powders prevents a premature solid state diffusion of carbon between and into the base iron particles. Certain metallic elements, particularly copper, may be used an

effective barrier to carbon loss during heating to the sintering temperature and while in the solid state condition (Kaufman, col. 4, lines 24-38).

Applicants respectfully submit that Kaufman fails to describe or suggest each and every element recited in claims 2 and 11. In particular, Kaufman fails to describe or suggest, at least,

> a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member, wherein the coating comprises a carbide formed by carbonizing a first element that comprises a property to increase a hardness of the layered Fe-based alloy member at the first portion, and wherein the coating further comprises a thickness of at least 0.5 mm; and
>
> a second element disposed in a second portion of the layered Fe-based alloy member, wherein the material comprises an amount that is greater on the outer surface than at an inside portion of the layered Fe-based alloy member,
>
> wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member,

as recited in claim 2 (emphasis added).

As noted in Applicants' Response dated August 21, 2009, embodiments of the invention are directed to providing a layered Fe-based alloy member with desired properties on *only a certain part* of the member, as described in the specification, at least, on page 18, line 16, to page 19, line 8. Powder is applied to the certain part of the member, *i.e.*, the workpiece-pressing part of a forging punch, so that the element of the powder diffuses *only* into that part of the member. Therefore, the Fe-based alloy member has desired properties along specific portions of the member.

The Office Action alleged that Kaufman describes a method for producing an iron-based alloy by blending an alloyed additive powder with an iron-base powder and further coating the additive alloy powder with copper (*see* Office Action on page 3). The Office Action further alleged that Kaufman describes that the iron-based alloy is used to produce an intermediate product from which sintered alloy parts are manufactured (the final product) (*see* Office Action, Response to Arguments on page 9; Kaufman, col. 10, line 26-29).

Kaufman merely describes a technique for coating an Fe-C alloy powder and a technique for manufacturing a sintered body by using the coated Fe-C alloy powder. In particular, Kaufman describes the use of a copper diffusion barrier applied as an envelope to each particle of the master alloy of powder in a controlled thin amount to control carbon loss during heating to a sintering temperature (Kaufman, col. 4, lines 24-45). Kaufman also describes that the powder supply is blended with the iron-base powder for making sintered alloy parts (the final product). The coating of the Fe-C alloy powder is unevenly distributed on the surface of the sintered body. However, Kaufman fails to further describe or suggest that *only a certain portion* of the sintered alloy parts is coated with a coating for increasing the hardness at that certain portion, while other parts of the member are not coated with the coating.

Accordingly, Kaufman fails to describe that the sintered alloy parts include "a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member … a second element disposed in a second portion of the layered Fe-based alloy

member … wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member," as recited in claim 2 (emphasis added).

Claim 11 has its own claim scope, but additionally contains limitations similar to those recited in claim 2. According, for similar reasons noted above for claim 2, Applicants respectfully submit that Kaufman fails to describe or suggest each and every element recited in claim 11.

Claims 8 and 16-19 depend from claim 2. Claims 13 and 14 depend from claim 11. Accordingly, claims 8, 13, 14, and 16-19 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 2, 8, 11, 13, 14, and 16-19 under 35 U.S.C. §102(b), or in the alternative, under 35 U.S.C. §103(a), and respectfully submit that claims 2 and 11, and the claims that depend therefrom, are now in condition for allowance.

Claim Rejections under 35 U.S.C. §103(a)

Claims 2, 8, and 16-19

The Office Action rejected claims 2, 8, and 16-19 under 35 U.S.C. §103(a) as being allegedly unpatentable over Tahara, *et al.* (U.S. Patent No. 5,792,282) ("Tahara") in view of ASM Handbook, Volume 4, Heat Treating ("ASM Handbook"). Applicants

respectfully submit that the claims recite subject matter that is neither described nor suggested in a combination of Tahara and the ASM Handbook.

As will be discussed below, a combination of Tahara and the ASM Handbook fails to describe or suggest each and every element recited in claims 2, 8, and 16-19, and therefore fails to provide the features discussed above.

Tahara describes a conventional surface treatment technique for carburizing austenitic stainless steel. In particular, Tahara describes a method of carburizing the austenitic stainless steel by holding the austenitic steel in a fluorine- or fluoride-containing gas atmosphere with heating prior to carburizing and carburizing the austenitic stainless steel at a temperature not more than 680ºC. The austenitic stainless steel is stable and has 1 to 6 weight % molybdenum or 13 to 25 weight % chromium. The carburized hard layer has a corrosion resistance superior to a base material of the austenitic stainless steel (Tahara, Abstract).

Applicants respectfully submit that Tahara fails to describe or suggest each and every element recited in claim 2. In particular, Tahara fails to describe or suggest, at least, "a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member … a second element disposed in a second portion of the layered Fe-based alloy member … wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member," as recited in claim 2 (emphasis added).

Generally, Tahara describes that austenite stainless steel is fluorinated and then carbonized. One of ordinary skill in the relevant art would have understood that in a process of carbonizing, as described in Tahara, a carbide layer (*e.g.*, a hardened layer) is unevenly distributed at a surface layer portion (*i.e.*, on an outer surface) of the steel. Thus, Tahara fails to describe or suggest, at least, "wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member," as recited in claim 2 (emphasis added).

Furthermore, as noted in the Office Action on page 5, Tahara, at column 6, lines 23-29, describes that carbon diffuses and penetrates the surface to form a deep uniform layer, whereby chromium carbide can hardly be identified. Tahara fails to describe or suggest that the austenitic stainless steel includes a coating on a *first portion* of the steel and a second element disposed in a *second portion* of the steel as recited in claim 2. The ASM Handbook fails to cure the deficiencies of Tahara with respect to these claim limitations.

Furthermore, as presented in Applicants' Response dated August 21, 2009, neither Tahara nor the ASM Handbook describes or suggests, at least, a coating that comprises "a thickness of at least 0.5 mm," as recited in claim 2. The Office Action alleged that the limitation for the coating "comprising a thickness of at least 0.5 mm," as recited in line 5 of claim 2, is not sufficient to distinguish the subject matter of the claims from the prior art because the limitation *merely changes the proportion (thickness) of a prior art product* (*see* Office Action on page 5). In the alternative, the Office Action alleged that

Tahara fails to specify the thickness of the carburized layer. The Office Action cited the ASM Handbook to allege that modifying time and/or temperature may achieve a carburized layer thickness greater than 1 mm, and therefore it would have been obvious to one of ordinary skill in the relevant art to have modified the time and temperature for the process described in Tahara to achieve any desired carburized layer thickness (*see* Office Action on pages 9-10). Applicants' respectfully disagree with the allegations presented in the Office Action.

The Office Action merely alleged that one of ordinary skill in the relevant art, desiring a thicker film would have known that time and/or temperature of a surface treatment could be modified to achieve a desired thickness. As noted in Applicants' Response dated August 21, 2009, on pages 15-17, the Office Action failed to provide a basis in fact and/or technical reasoning to reasonably support the Office Action's allegations that one of ordinary skill in the relevant art would have found it obvious to increase the carburizing depth described in Tahara by a magnitude of over eight times, when Tahara explicitly describes that the maximum depth of the carburized layer is limited to 70 μm. Hence, the Office Action has provided no support from the knowledge of one of ordinary skill in the relevant art to have modified Tahara to include a carburizing depth exceeding the maximum-defined depth by a magnitude of over eight times. The ASM Handbook fails to cure the deficiencies of Tahara with respect to the claim limitations. Accordingly, the combination of Tahara and the ASM Handbook fails to describe or suggest each and every element recited in claim 2.

Claims 8 and 16-19 depend from claim 2. Accordingly, claims 8 and 16-19 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 2, 8, and 16-19 under 35 U.S.C. §102(b), or in the alternative, under 35 U.S.C. §103(a), and respectfully submit that claim 2, and the claims that depend therefrom, are now in condition for allowance.

Claims 2, 8, 11, 13, 14, and 16-19

The Office Action rejected claims 2, 8, 11, 13, 14, and 16-19 under 35 U.S.C. §103(a) as being allegedly unpatentable over Wang, *et al.* (U.S. Patent No. 6,680,129) ("Wang"). Applicants respectfully submit that the claims recite subject matter that is neither described nor suggested in Wang.

As will be discussed below, Wang fails to describe or suggest each and every element recited in claims 2, 8, 11, 13, 14, and 16-19, and therefore fails to provide the features discussed above.

Wang fails to describe or suggest each and every element recited in claim 2. In particular, Wang fails to describe or suggest, at least, "a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member … a second element disposed in a second portion of the layered Fe-based alloy member … wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion

than on the outer surface of the layered Fe-based alloy member," as recited in claim 2 (emphasis added).

Wang is directed to a steel composition. Wang describes chain parts and other steel articles that are provided with a hard, wear-resistant carbide coating by tumbling them in a heated retort with a particular mix that includes a source of vanadium and/or niobium (Wang, col. 2, line 60, to col. 6, line 12). The chain parts and other steel articles described in Wang *are completely coated* with the carbide. Therefore, Wang fails to describe two separate portions, a first portion and a second portion, as recited in claim 2.

Furthermore, at column 3, line 13, and column 6, lines 39-40, Wang describes that the steel is immersed in ferrovanadium (FeV), ferroniobium (FeNb), or mixed FeV/FeNb. Wang also describes, at column 3, lines 21-29, that halide vanadium or halide niobium draws carbon (see chemical equation). Hence, one of ordinary skill in the relevant art would have understood that Wang describes that carbon is drawn from the steel by displacement of halide (Cl in the exemplified equation). One would have further understood that such a reaction mechanism is distinguishable from the diffusion mechanism described for embodiment of the present invention.

Furthermore, according to the reaction mechanism described in Wang, only carbon diffuses toward a surface of the steel, and a composition ratio of vanadium or niobium does not change. Therefore, one would have understood that Wang fails to describe the features recited in claim 2, whereby the composition of the layered Fe-based alloy member "at the first portion is greater at the inside portion than on the outer surface of

the layered Fe-based alloy member," as recited in claim 2. Accordingly, Wang fails to describe or suggest each and every element recited in claim 2.

Claim 11 has its own claim scope, but additionally contains limitations similarly recited to those in claim 2. Accordingly, for similar reasons noted above for claim 2, Applicants respectfully submit that Wang fails to describe or suggest each and every element recited in claim 11.

Claims 8 and 16-19 depend from claim 2. Claims 13 and 14 depend from claim 11. Accordingly, claims 8, 13, 14, and 16-19 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 2, 8, 11, 13, 14, and 16-19 under 35 U.S.C. §102(b), or in the alternative, under 35 U.S.C. §103(a), and respectfully submit that claims 2 and 11, and the claims that depend therefrom, are now in condition for allowance.

CONCLUSION

In conclusion, Applicants respectfully submit that Kauffman, Tahara, the ASM Handbook, and Wang, whether taken individually or in combination, fail to describe or suggest each and every element recited in claims 2, 8, 11, 13, 14, and 16-19. The distinctions previously noted are more than sufficient to render the claimed invention unanticipated and non-obvious. It is therefore respectfully requested that all of claims 2, 8, 11, 13, 14, and 16-19 be allowed, and the present application be passed to issuance.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

/Brad Y. Chin/

_____

Brad Y. Chin
Attorney for Applicants
Registration No. 52,738

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Vienna, Virginia 22182-6212
Telephone: 703-720-7800
Fax: 703-720-7802

BYC:dlh